## NOTES.

PROF. CORNU, the Vice-President of the Paris Academy of Sciences, is now in England, and will deliver the discourse at the Royal Institution to-morrow evening. On Tuesday evening he was entertained by the members of the Athenæum Club who are members of the Institut de France, either as Associates or Correspondants. There were present, representing the Académie des Sciences, Lord Kelvin (Associate), Sir H. Gilbert, Mr. Huggins, Mr. Lockyer, Admiral Sir G. H. Richards, and Mr. Sylvester (Correspondants); representing the Académie des Inscriptions, Sir J. Evans and Sir E. Maunde Thompson; representing the Académie des Beaux Arts, Mr. Herkomer. Letters of regret for unavoidable absence were read from Mr. Frankland and Sir Joseph Lister, Associates of the Académie des Sciences; and Sir J. Hooker, Lord Rayleigh, Sir A. Geikie, Dr. Williamson, and Sir H. Roscoe, Correspondants; Académie des Beaux Arts, Sir J. Millais, Mr. Alma-Tadema, Sir E. Burne-Jones; Académie des Sciences Morales et Politiques, Mr. Goschen, Mr. Bryce, Mr. Lecky, and Sir F. Pollock.

MR. HERBERT SPENCER has been created by the German Emperor a foreign Knight of the Order Pour le Mérite. Another mark of the esteem in which he is held is his election as an Honorary Member of the Vienna Academy of Sciences.

SIR ARCHIBALD GEIKIE has just been elected a Corresponding Member of the same Academy.

DR. BACKLUND has been appointed Director of the Pulkova Observatory, and Dr. Hermann Struve will succeed the late Dr. C. F. W. Peters as Director of the Königsberg Observatory.

IT is noted in *Science* that Deputy Surgeon-General J. S. Billings will shortly leave the Army Medical Museum, of which he is curator, and the Library of the Surgeon-General's Office, of which he is librarian, having accepted the chair of Hygiene in the University of Pennsylvania. Dr. Billings hopes to complete his work on the final volume of the great Index Catalogue before his retirement.

DR. JOHN ANTHONY, whose name is familiar to many workers in microscopy, died at Birmingham on Monday, at eighty-one years of age.

THE death is announced of Prof. Franz Ernst Neumann, Honorary President of the Physikalisch-Ökonomische Gesellschaft at Königsberg. Prof. Neumann died on May 23 at the advanced age of ninety-seven, having been born September 11, 1798. He was eminent in the department of mathematical physics, and was elected a foreign member of the Royal Society of London in 1862.

AMONG other deaths of scientific men abroad, we notice that of Dr. John Byron, well-known for his bacteriological researches. He was bacteriologist in the Loomis Laboratory, and lecturer on bacteriology in the University Medical School of New York. Dr. Byron is believed to have contracted the disease of which he died, by inhaling tubercle bacilli while carrying out some experiments. The deaths are also announced of Dr. O. Reich, at Berlin; Dr. F. Müller, the zoologist, at Basel; and Brigadier-General Charles Sutherland, formerly Surgeon-General of the United States Army, at Washington.

THE Harveian Oration will be delivered at Edinburgh on June 28, by Dr. Yellowlees.

THE Secretary of State for the Home Department has requested the following gentlemen to inquire into and report on the manufacture, filling, and use of gas cylinders:—Prof. C. V. Boys, Prof. H. B. Dixon, Dr. A. Dupré, the Rev. F. J. Smith, and Prof. W. C. Unwin. Mr. Robert F. Reynard, of the Home Office, will act as secretary.

ACTING under the Wild Birds Protection Act, 1894, notice has been given by the Home Secretary, that the taking or destroying of the eggs of the "barn owl, brown or wood owl, long-eared owl, short-eared owl, common buzzard, merlin, kestrel, goldfinch, black-headed gull, peregrine falcon, kingfisher, dotterel, raven, heron, bittern, woodcock, dipper or water ouzel, and golden plover," is prohibited in any part of the county of Westmorland.

THE preliminary programme for the sixty-third annual meeting of the British Medical Association, to be held in London from July 30 to August 2, is given in the *British Medical Journal*. The President, Sir J. Russell Reynolds, will deliver his address on July 30. The Address in Medicine will be delivered by Sir William Broadbent on the following day. Mr. Jonathan Hutchinson, F.R.S., will give the Address in Surgery on Thursday, August 1, and the Address in Physiology will be given by Prof. E. A. Schafer at the concluding meeting on August 2.

AT the annual general meeting of the Institution of Civil Engineers, held last week, Sir B. Baker was elected President, and Mr. J. Wolfe Barry, C.B., Mr. W. H. Preece, C.B., Sir Douglas Fox, and Mr. James Mansergh Vice-Presidents. The members of the Council are Dr. W. Anderson, Mr. Alex. R. Binnie, Mr. W. R. Galbraith, Mr. J. H. Greathead, Mr. J. C. Hawkshaw, Mr. C. Hawksley, Dr. John Hopkinson, Dr. Alex. B. W. Kennedy, Sir G. L. Molesworth, Sir Andrew Noble, Sir E. J. Reed, Mr. W. Shelford, Mr. F. W. Webb, Sir W. H. White, and Sir E. Leader Williams.

WE have received from Dr. P. Bergholz, Director of the Meteorological Observatory at Bremen, the results of the hourly observations made during the year 1894, with rainfall values obtained from four stations in the suburbs. This observatory forms part of the regular German meteorological service, and the results are therefore given in the form recommended by recent congresses; but in addition to the prescribed observations the work contains other valuable information, *e.g.* phenological observations, and the dates of freezing and clearing of the Weser since 1818. This table shows that the most prolonged frosts during that period were in 1844-5, 1846-7, 1857-8, and 1870-1. In each case the Weser was frozen over for two months or upwards. We observe, however, that the publication of the data is to be discontinued, as that river is now kept free for navigation by artificial means. A graphical representation of the principal meteorological results gives a ready means of comparing the characteristics of the different months.

THE Egyptian Government have published an important paper on the climate of Cairo and Alexandria, based on observations taken between 1886 and 1890, and discussed by Dr. Engel, chief of the Statistical Service. The work contains a number of tables and diagrams, together with introductory text, from which we extract a few of the results obtained. At Cairo, the mean annual temperature for the five years was 70°·3, the absolute maximum being 118°·2 on June 13, 1886, and the lowest 33°·8 on January 1, 1890. The average yearly number of rainy days was twenty-four, and the amount 1·2 inch only. At Alexandria, the mean temperature was 68°·5, the absolute maximum being 100°·6, on May 10, 1889, and the minimum 43°·9, on January 22, 1889. The average number of rainy days was forty, and the amount 8·2 inches. The principal difference in the climate of the two places consists in the diurnal and seasonal variations of temperature. Cairo is much the hotter of the two places in summer, but cooler than Alexandria in the winter; and the differences in the extreme temperatures are much greater at

Cairo, both as regards days and seasons. Relative humidity varies much more at Cairo than at Alexandria, but it is much lower at Cairo in summer, and a little higher in winter than at Alexandria; while, on the contrary, the absolute humidity varies much more at Alexandria, being very high in summer and considerably greater than at Cairo. Both places enjoy a large amount of sunshine, but fog occurs occasionally, more particularly at Cairo in the early morning.

A MOST important contribution to the study of the formation of dolomite is made by M. C. Klement, in the *Bull. Soc. Belge Géol. Paléontol. et Hydrol.* After describing the history of theories of dolomite, the author calls attention to the frequent occurrence of dolomite in the form of coral-reefs, as observed by Dupont in the Devonian, by Richthofen and Mojsisovics in the Trias, and by Dana in the recent raised reefs of Metia in the Pacific. He points out that while in the chemical experiments that have been made with a view of dolomitising carbonate of lime, *calcite* has always been operated on, the substance of coral has been shown by Sorby to be probably *aragonite.* The author has therefore carried out a large series of experiments on the action of the constituents of sea-water (particularly magnesium sulphate) on aragonite, the results of which are given at full length. From these he finds (1) that a solution of magnesium sulphate, in the presence of sodium chloride, and at a temperature of 60° C. or more, decomposes aragonite with formation of a magnesium carbonate the exact composition of which is difficult to determine, owing to the impossibility of isolating it from the residual aragonite; (2) that this action increases with the *rise of temperature*, and with the *concentration* of the solution, and is greatly diminished by the absence of sodium chloride; (3) that recent coral is attacked by magnesium sulphate just as mineral aragonite is; and (4) that the lagoons of modern coral-reefs afford all the conditions of temperature, saturation, &c., necessary for the production of magnesium carbonate in the manner of his experiments. While recognising, therefore, that dolomites may have been formed in more ways than one, M. Klement concludes that one of the most usual ways of formation of dolomite in nature has been the action of heated and concentrated sea-water in coral-lagoons on the aragonite of coral and other skeletons, with formation of carbonate of magnesium, which is subsequently, perhaps after solidification of the rock, with the remaining carbonate of calcium, converted into massive dolomite.

THE last number of *Modern Medicine and Bacteriological Review* is of exceptional interest, inasmuch as it contains an original article by Prof. Metchnikoff, of the Pasteur Institute, on "the extra-cellular destruction of bacteria in the organism." This article is really a critical comment upon some of the conclusions deduced by Dr. Pfeiffer from his experiments on the destruction of cholera vibrios in the peritoneal cavity of guinea-pigs. Dr. Pfeiffer observed this destruction of cholera vibrios when the latter were introduced into animals previously vaccinated against this germ, and also in the case of unprotected animals when the vibrios were injected together with a small quantity of serum from vaccinated animals. In both cases Dr. Pfeiffer found that they were destroyed *outside* the cells in the peritoneal fluid, and he believes that this bacteria-killing fluid is secreted by the cellular elements in consequence of a special excitation produced by the injection of cholera vibrios, and that the immunity acquired by guinea-pigs is independent of phagocytosis. Prof. Metchnikoff, however, regards this as an episode in the battle between bacteria and phagocytes, and maintains, on evidence supported by experiments, that the leucocytes secrete this bacteria-killing fluid whilst undergoing a process of degeneration due to the injection of Pfeiffer's mixture of vibrios, serum, and broth. That although unable to engulf the vibrios, they are able still to destroy them by their secretions. Metchnikoff points out that if before introducing the vibrio-mixture, a few cubic centimetres of broth be injected into the peritoneal cavity, the leucocytes will gather together in great force after a few hours, and if the vibrio-mixture be then introduced, phagocytosis does take place, and the cholera bacteria are more rapidly destroyed by this process of intra-phagocytosis than by the extra-cellular destruction produced by the conditions of Pfeiffer's experiments. The mechanism of immunity is surrounded with so many complicated problems that the search for its solution, whilst one of the most interesting tasks afforded by the developments of bacteriology, must still remain one of the most puzzling and difficult.

THE current number of the *Journal de Physique* contains an important paper by M. P. Curie on the magnetic properties of bodies at different temperatures. The author has examined the magnetic properties of a number of substances in fields of from 25 to 1350 C.G.S. units, and in some cases for temperatures from 15° to 1370° C. The body under observation was generally in the form of a coarse powder, and was enclosed in a glass bulb, which was placed in a non-uniform magnetic field produced by two electro-magnets. The force acting on the body was measured by means of the torsion of a wire. For the purposes of heating the glass bulb was surrounded by a fine clay jacket, and this latter was heated by a wire in which an electric current was passed, the temperature being measured by means of a thermo-electric junction. In the case of diamagnetic bodies, with the exception of bismuth and antimony, the author finds that temperature has practically no effect on their magnetic properties. Fusion and allotropic modification also seem to produce no effect, so that the magnetic properties of a body seem to depend not on the arrangement, but rather on the nature of the molecules of the body. Selenium, however, is an exception, for in this case the susceptibility is about 3 or 4 per cent. smaller in absolute value in the liquid than in the solid state. Phosphorus is another exception, for the susceptibility of the different allotropic modifications are slightly different. The susceptibility of bismuth increases with rise of temperature, according to a straight line law, up to the melting-point, where there is a sudden rise. The susceptibility of melted bismuth is independent of temperature, and is very nearly 0. Observations made on oxygen show that the coefficient (K), which, when multiplied into the strength of the magnetic field, gives the magnetic moment of the body per unit mass (the author calls this the coefficient of specific magnetisation), is independent of the pressure, and is between 20° and 450° inversely proportional to the absolute temperature. In the case of solutions of paramagnetic salts, K is also found to vary inversely as the absolute temperature; thus supporting the observations of Wiedemann and Plessner on this subject. Glass when cold is generally feebly diamagnetic; when heated, however, it becomes much more strongly diamagnetic. The rate of increase of the diamagnetism decreases as the temperature rises; above 300° C. no further change takes place. The author considers these changes to be due to the fact that glass consists chiefly of a diamagnetic substance, the properties of which remain unaltered when the temperature rises, and of a small quantity of a relatively strongly para-magnetic substance, the para-magnetism of which decreases as the temperature rises.

MESSRS. GEORGE PHILIP AND SON will shortly publish "The Exploration of Australia," by Mr. Albert F. Calvert. This book is designed to form a companion volume to Mr. Calvert's work, "The Discovery of Australia," and will trace the progress of maritime and land exploration frem the period of Captain Cook, up to recent times.

A TRANSLATION, by Mr. W. E. Baxter, is announced of Van Heurck's important treatise on the Diatomaceæ. It will contain about 2000 figures, illustrating every known genus of diatoms, and every species found in the North Sea and countries bordering it, including Great Britain.

THE second edition of "Elements of Marine Surveying," by the Rev. J. L. Robinson, lately published by Messrs. Macmillan and Co., contains several very useful additions and improvements. Young marine surveyors will find the volume an excellent aid to the study of the theoretical side of their profession, and would do well to include it in their outfit.

PARTICULARS of editions of Gilbert White's "Natural History and Antiquities of Selborne" have been compiled by Mr. Edward A. Martin, for the Selborne Society. Since the original edition was published in 1789, twenty-three other editions have appeared. The list compiled by Mr. Martin, gives the dates of the various editions, publishers, printers, editors, number of pages, and general description.

THE annual report of the Royal Botanic Gardens, Trinidad, for the year 1894, compiled by the Superintendent, Mr. J. H. Hart, furnishes evidence of the practical value of these colonial botanic gardens, and of their relation with the central institution at Kew. Under the Economic Section, information is given of the growth in the island of the sugar-cane, cacao, coffee, yam, gambier, vanilla, the Brazil nut, and cola, and of the principal enemies of these crops, and the best mode of combating them.

WE have received Part i. of "The Flowering Plants and Ferns of New South Wales," with especial reference to their economic value, by Mr. J. H. Maiden, assisted by Mr. W. S. Campbell, and issued under the authority of the Department of Mines and Agriculture for New South Wales. The present part contains descriptions and coloured drawings of four species—*Telopea speciosissima*, *Eucalyptus corymbosa*, *Actinatus helianthi*, and *Acacia glaucescens*. It is intended in this way to illustrate the principal flowering plants and ferns of the colony.

THE additions to the Zoological Society's Gardens during the past week include a Panolia Deer (*Cervus eldi*, ♂) from Hainan, presented by Mr. Julius Neumann; a Ruddy Ichneumon; (*Herpestes smithii*) from India, presented by the Earl of Hopetoun; a Spotted Ichneumon (*Herpestes nepalensis*) from India, presented by Mrs. Thompson; a Rosy-faced Love-Bird (*Agapornis pullaria* from West Africa, presented by Mr. Cecil M. Bevan; a Rufescent Snake (*Leptodira rufescens*) from South Africa, presented by Mr. J. E. Matcham; a Spiny Tree Porcupine (*Sphingurus spinosus*) from Peru, a Blossom-headed Parrakeet (*Palæornis cyanocephala*) from India, two Tuberculated Iguanas (*Iguana tuberculata*) from South America, deposited; two Guira Cuckoos (*Guira pirirgua*) from Para, purchased; a Japanese Deer (*Cervus sika*, ♀), born in the Gardens.

## OUR ASTRONOMICAL COLUMN.

THE MOTION OF THE SOLAR SYSTEM.—The methods elaborated by Argelander and Airy for the numerical solution of this problem have been followed with more or less variation by a host of investigators. As a rule the deviations in method have involved matters of detail rather than any fresh departure. Various suppositions have been made as to the motions of the stars themselves (*motus peculiares*): that the magnitude and direction of these motions have no connection with position, or that, in general, all these motions take place with the same angular velocity parallel to the galactic circle. Stars may be grouped according to their brilliancy, or the amount of their proper motion, or they may be arranged with more or less ingenuity according to their apparent position; but when the final equations are solved, the results are found to be fairly accordant. This fact has been recently demonstrated by M. Pannekoek, who, to vary the problem as much as possible, has based his investigations on the type of spectrum presented by the star. The zone from which the stars are selected is somewhat limited, being restricted to 0°—20° of declination, the spectra of which have been observed at Potsdam. The stars have been divided into four groups, according to the amount of the proper motion, with the following results:—

*Stars of the First Type.*

| | No. of stars. | Centennial proper motion. | Position of apex. | |
|---|---|---|---|---|
| | | | R.A. (α). | Declination (δ). |
| I. | 203 | 2″·11 | 322°·8±19°·2 | +14°·7±7°·0 |
| II. | 93 | 5·58 | 304·7± 4·6 | +12·1±3·4 |
| III. | 58 | 9·84 | 275·8± 6·1 | +18·3±3·6 |
| IV | 48 | 34·36 | 251·6±12·1 | +33·0±7·3 |

*Stars of the Second Type.*

| | | | | |
|---|---|---|---|---|
| I. | 77 | 2·07 | 274·6± 9·6 | − 2·6±6·3 |
| II. | 52 | 5·93 | 280·1± 9·9 | +35·8±6·5 |
| III. | 65 | 20·85 | 268·6± 7·1 | +31·4±4·6 |

The result derived from stars of small proper motion of either the first or second type of spectra is scarcely accordant with previous investigations. The Right Ascension of the one and the Declination of the other are sensibly different from results involving larger numbers of stars. The author remarks, however, that all the values in R.A. can be rendered less discordant by an increase in the constant of precession of +0″·01, and in Declination by assuming a constant negative error in the proper motions themselves. Here we have again evidence that no rearrangement of groups materially alters the position assigned for the apex of the sun's way; but when processes sensibly different in their conception are employed, the accordance in the results is not so gratifying. For instance, the attempt to determine the position of the apex from Vogel's measurements of the motion of stars in the line of sight led to either of the two results, according to the method of "weighting" employed.

| | I. | II. |
|---|---|---|
| α | 206°·1±12°·0 | 159°·7±20°·2 |
| δ | + 45·9± 9·2 | + 50·0±14·3 |

Here, if the Declination be fairly satisfactory, the Right Ascension is hopelessly discordant. On the other hand, Dr. Kobold's treatment of the problem according to the graphical method suggested by Bessel, a method which does not easily lend itself to numerical treatment, gives a fairly satisfactory result in R.A., but the Declination will scarcely be accepted. The position assigned to the apex by this method is α = 266°·5; δ – 3°·1. This result is based on 1425 stars, and ought to be entitled to considerable weight if it could be satisfactorily demonstrated that all ambiguity, which arises from the definition of the poles of the great circles in which the proper motions take place, had been satisfactorily removed. This question is still *sub judice*, and while distinct methods give conflicting results, it is not wise to insist too strictly on the direction of the motion of the solar system.

THE ROTATION OF MARS.—Among numerous observations of the planet Mars during the last opposition, Mr. Percival Lowell gave his attention to the measurement of the longitudes of some of the more conspicuous markings. The observations covered 36 points in all, and were made with a power of 440 on the 18-inch refractor of the Lowell Observatory. The first fact that emerged from the observations was that all the longitudes as given in Marth's ephemeris were affected by a systematic error of about 5°; or, in other words, the Martian features were retarded by about twenty minutes as compared with the computed times. The cause suggested for the discrepancy between the calculated and observed positions is that the received time of rotation of the planet is a trifle too small, and that the longitudes are consequently falling slowly behind their predicted times of meridian passage.

A somewhat similar discrepancy appears to have been noted by Prof. Keeler in 1892, who ascribed it partially to the constant error in estimating the position of the diameter of a large disc (*Astrophysical Journal*, May).

THE SUN'S STELLAR MAGNITUDE.—A new method of computing this important constant, being the number representing the sun's brightness on the scale in which the magnitudes of stars are represented, has been employed by Mr. Gore (*Knowledge*, June). Taking one of the outer planets, the known size and distance